GROUP 15

INTAKE AND EXHAUST

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GENERAL INFORMATION

M1151000100703

The exhaust pipe is divided into three parts.

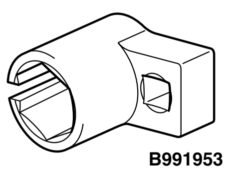
SERVICE SPECIFICATIONS

M1151000300848

Item	Standard value	Limit
Turbocharger supercharging pressure (waste gate solenoid valve not operating) kPa	39 – 65	–
Initial activation pressure of waste gate actuator (at the stroke of approxim ately 1mm) kPa	60	–
Waste gate solenoid valve coil resistance (at 20°C) Ω	29 – 35	–
Initial activation pressure of air by pass valve kPa	Approximately 53	–
Manifold distortion of the installation surface mm	0.15 or less	0.20

SPECIAL TOOL

M1151000600623

Tool	Number	Name	Use
 B991953	MB991953	Oxygen sensor wrench	Removal and installation of oxygen sensor

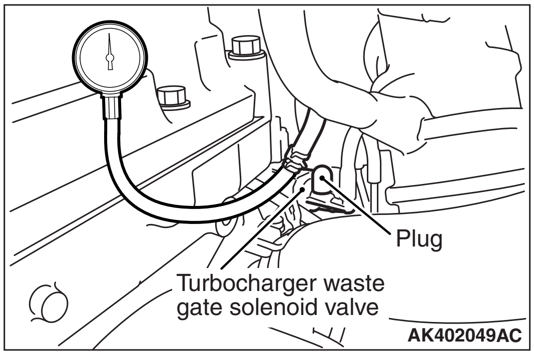
ON-VEHICLE SERVICE

TURBOCHARGER SUPERCHARGING PRESSURE CHECK <4G1>

M1151001000356

⚠ CAUTION

Two persons should be in the vehicle when the test is conducted; the person in the passenger seat should read the indications shown by the pressure meter.



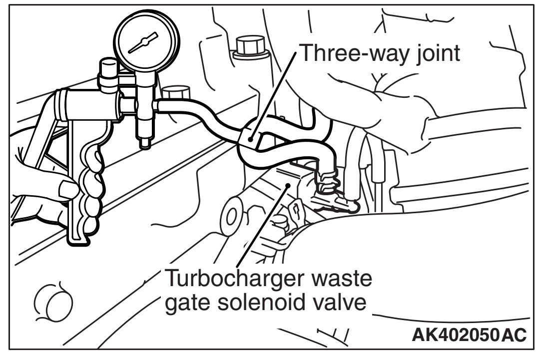
1. Disconnect the hose (white paint mark) from the turbocharger waste gate solenoid valve, and connect the pressure gauge to the hose. Plug the nipple of the solenoid valve from which the hose (white paint mark) has been disconnected.
2. Drive at full-throttle acceleration in second gear and then measure the supercharging pressure when the engine speed in about 3,000 r/min.

   Standard value: 39 – 65 kPa

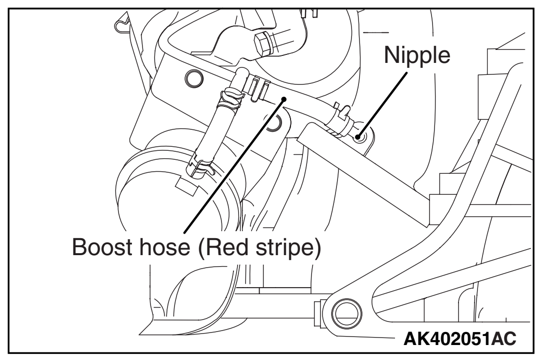
3. If the supercharging pressure deviates from the standard value, check the following items for possible cause.
   - Malfunction of the waste gate actuator
   - Leakage of supercharging pressure
   - Malfunction of the turbocharger
4. When the indicated supercharging is more than standard value, supercharging control may be faulty, therefore check the followings.
   - Malfunction of the waste gate actuator
   - Malfunction of waste gate valve
   - Disconnection or cracks of the waste gate actuator rubber hose

SUPERCHARGING PRESSURE CONTROL SYSTEM CHECK <4G1>

M1151001100267



1. Disconnect the hose (white paint mark) from the turbocharger waste gate solenoid valve and connect a three-way joint between the hose and the solenoid valve.
2. Connect a hand vacuum pump to the three-way joint.



3. Disconnect the hose from the turbocharger waste gate actuator control boost nipple and plug the nipple.
4. Applying a negative pressure with the hand vacuum pump, check tightness both when the hose end is closed and when it is open.

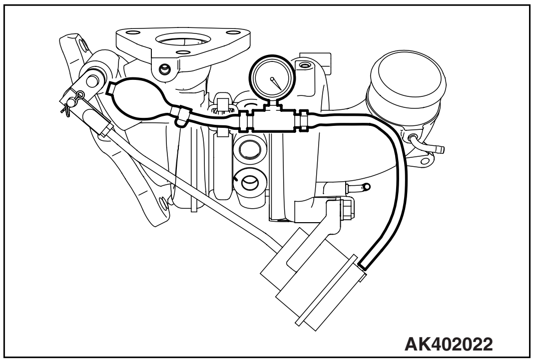
Engine state	Hose end	Normal state
Stop (Ignition switch: ON)	Opened	Negative pressure leaks.
	Closed	Negative pressure is maintained.
Idling (after warm-up)		Negative pressure leaks.

NOTE: If this check indicates an abnormal condition; the turbocharger waste gate actuator, turbocharger waste gate solenoid or hose is broken.

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Group TOC

WASTE GATE ACTUATOR CHECK <4G1>

M1151001200297



1. Connect a manual pump (pressure-application type) to nipple.

⚠ CAUTION

In order to avoid damage to the diaphragm, do not apply a pressure of 75 kPa or higher.

2. While gradually applying pressure, check the pressure that begins to activate (approximately 1 mm stroke) the waste gate actuator rod.

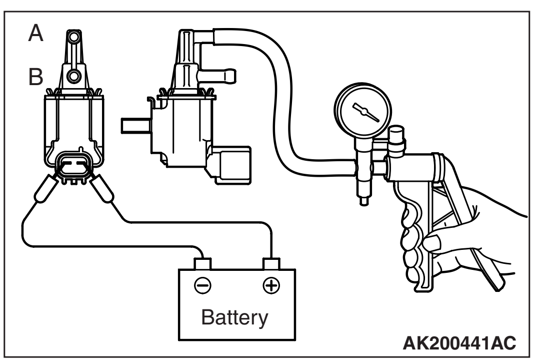
   Standard value: Approximately 60 kPa

3. If there is a significant deviation from the standard value, check the actuator or the waste gate valve: replace actuator or turbocharger assembly if necessary.

WASTE GATE SOLENOID VALVE CHECK <4G1>

M1151001300205

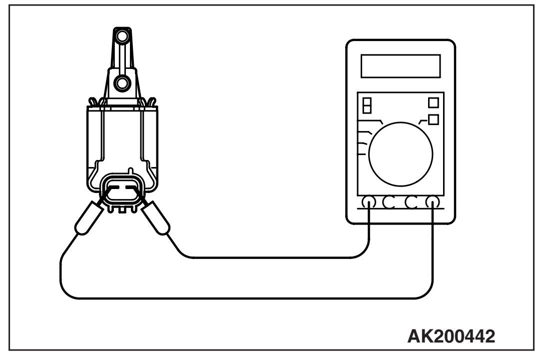
OPERATION CHECK



1. Connect a hand vacuum pump to the solenoid valve nipple A.
2. Using a jumper wire, connect between the solenoid valve terminal and battery terminal.
3. Connecting and disconnecting the jumper wire at the battery negative terminal to apply a negative pressure, check tightness.

Jumper wire	B nipple condition	Normal condition
Connected	Opened	Negative pressure leaks.
	Closed	Negative pressure is held.
Disconnected	Opened	Negative pressure is held.

COIL RESISTANCE CHECK

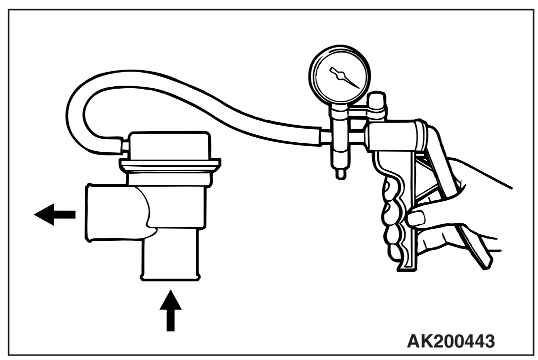


Measure the resistance between solenoid valve terminals

Standard value: 29 – 35 Ω (at 20°C)

AIR BY-PASS VALVE CHECK <4G1>

M1151001600165



1. Remove the air bypass valve.
2. Connect the hand vacuum pump to the nipple of the air bypass valve.
3. Apply a negative pressure of approximately 93 kPa, and check that air tightness is maintained.
4. Also check operation of the valve.

   Standard value:

Negative pressure	Valve operation
Approximately 53 kPa	It starts opening

INTAKE MANIFOLD VACUUM CHECK

M1151001800266

Refer to GROUP 11A – On-vehicle Service P.11A-13. <4A9>

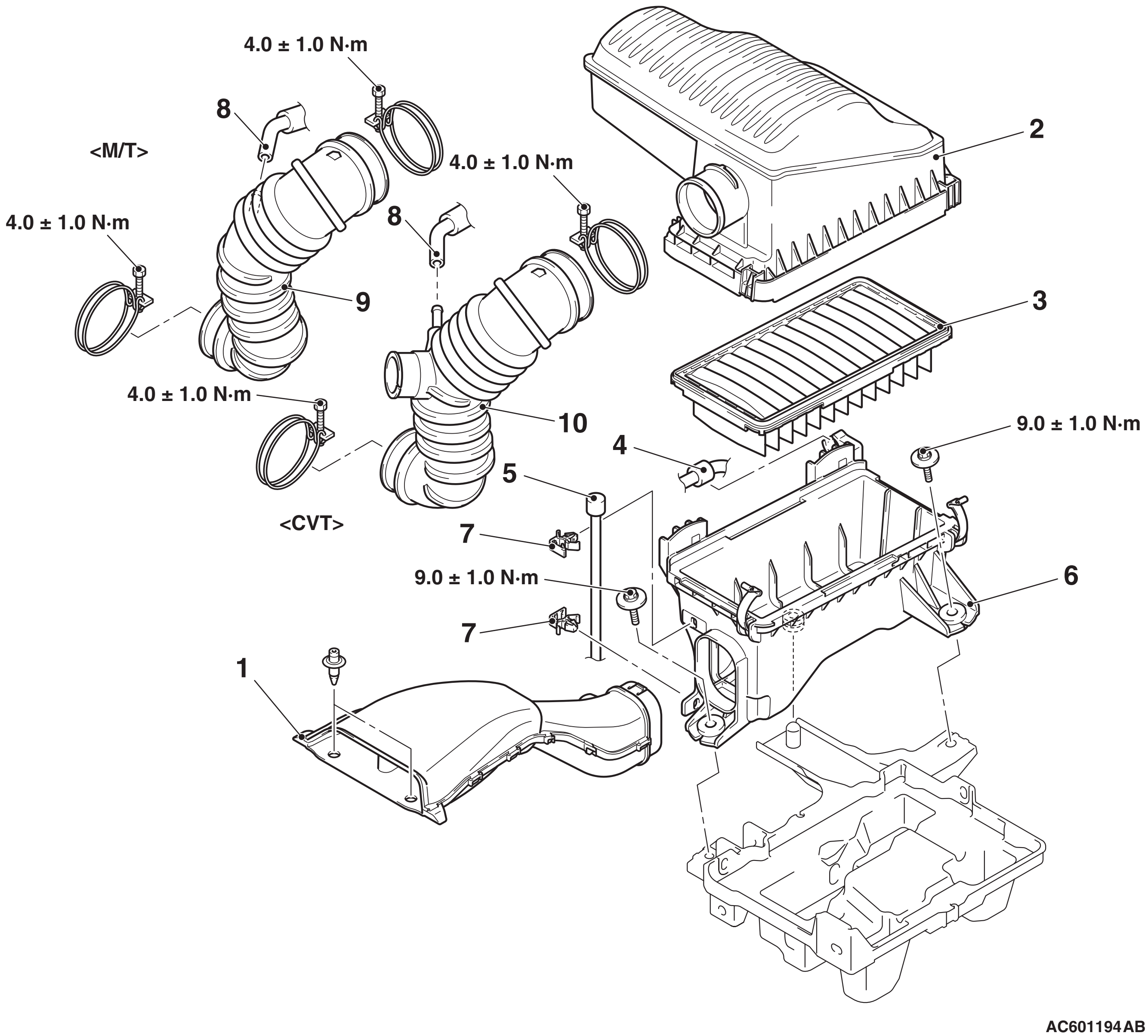
Refer to GROUP 11C – On-vehicle Service P.11C-14. <4G1>

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AIR CLEANER

REMOVAL AND INSTALLATION <4A9>

M1151002101177



Removal steps

1. Air cleaner intake duct
2. Air cleaner cover
3. Air cleaner element
4. Fuel vapour control hose
5. Breather hose

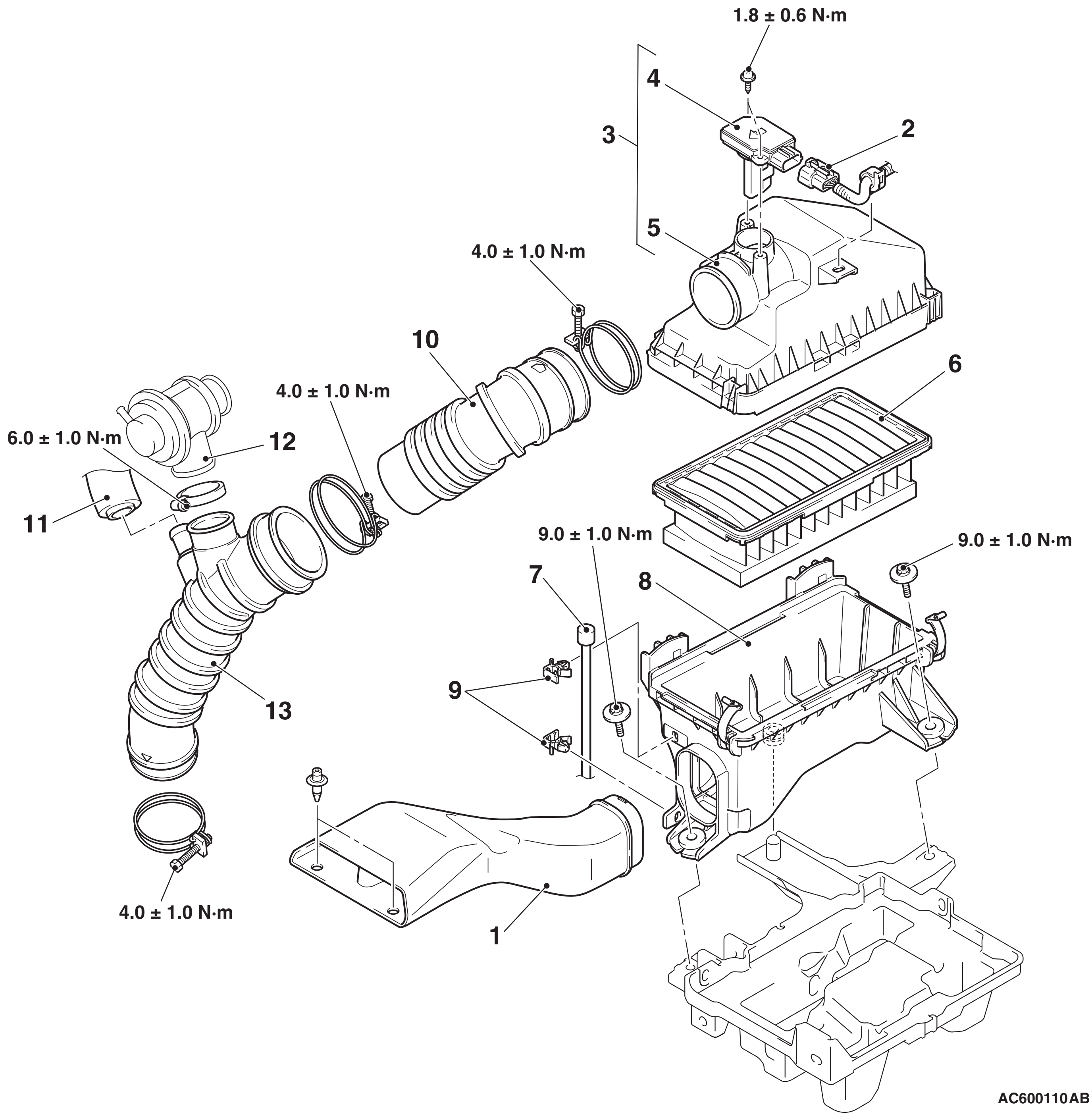
Removal steps (Continued)

6. Air cleaner body assembly
7. Clip
8. Breather hose connection
9. Engine air intake hose <M/T>
10. Engine air intake hose <CVT>

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Group TOC

REMOVAL AND INSTALLATION <4G1>

M1151002101315



Removal steps

1. Air cleaner intake duct
2. Air cleaner air flow sensor connector
3. Air cleaner air flow sensor, air cleaner cover assembly
4. Air cleaner air flow sensor
5. Air cleaner cover
6. Air cleaner element

Removal steps (Continued)

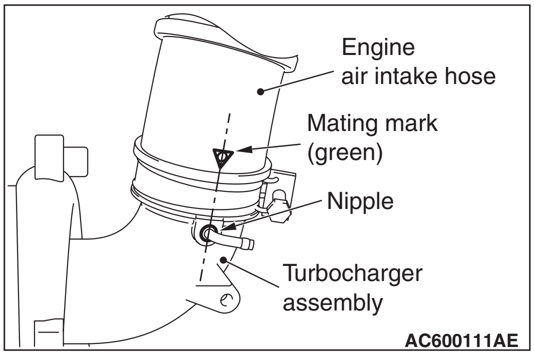
7. Breather hose
8. Air cleaner body assembly
9. Clip
10. Engine air intake hose
11. Breather hose connection

>>**B**<< 12. Air by-pass valve connection
>>**A**<< 13. Engine air intake hose

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Group TOC

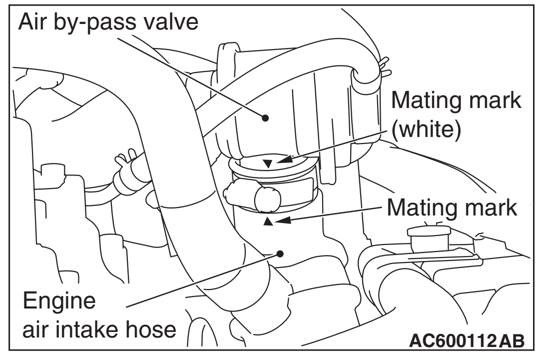
INSTALLATION SERVICE POINTS

>>A<< ENGINE AIR INTAKE HOSE INSTALLATION



Install by aligning the mating mark (green) on the engine air intake hose with the nipple on the turbocharger assembly.

>>B<< AIR BY-PASS VALVE CONNECTION



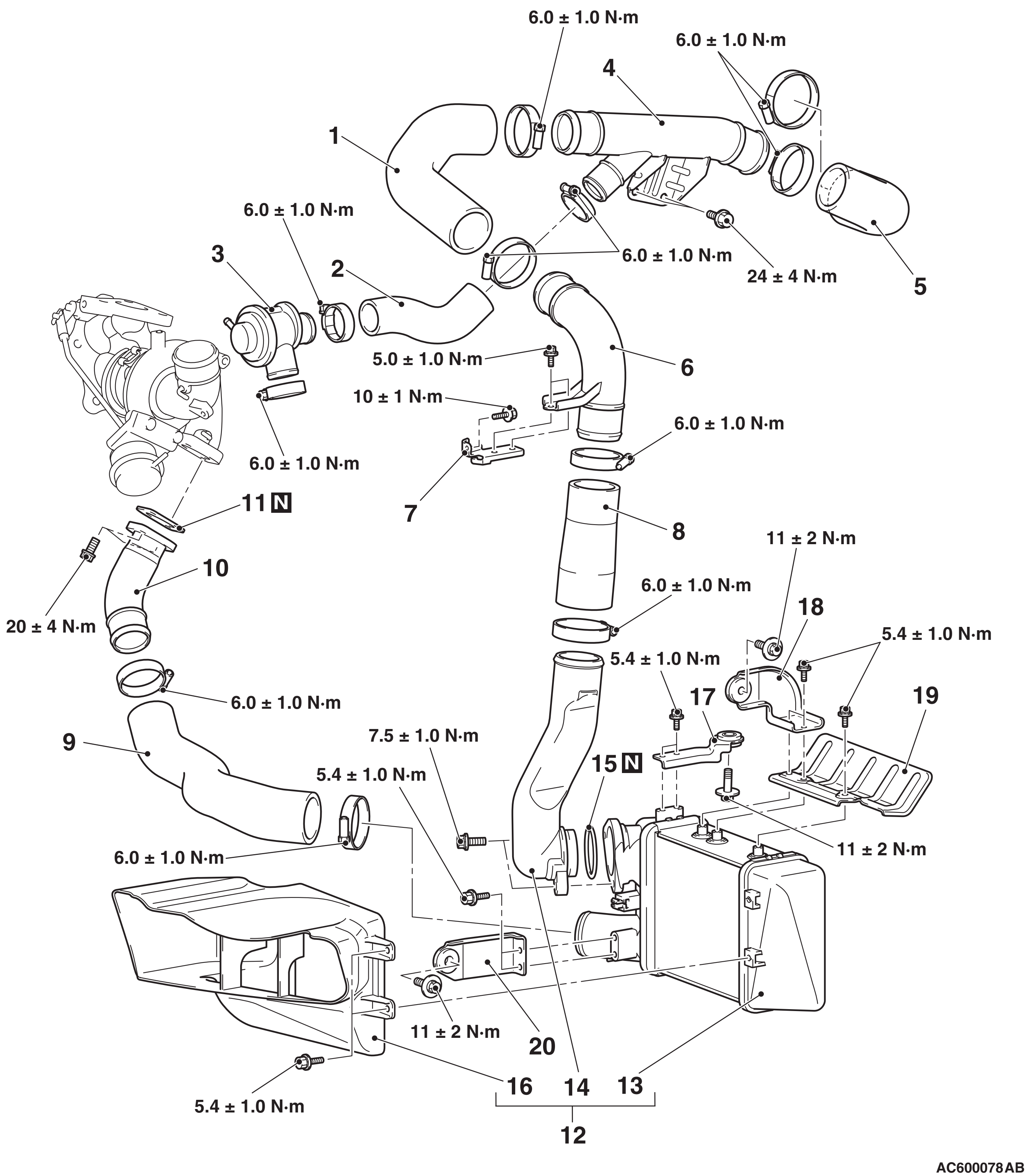
Install by aligning the mating mark (white) on the air by-pass valve and the mating mark on the engine air intake hose.

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Group TOC

INTERCOOLER

REMOVAL AND INSTALLATION <4G1>

M1151004200188



Removal steps

- >>**H**<< 1. Air hose C
- >>**G**<< 2. Air by-pass hose
- >>**F**<< 3. Air by-pass valve

Removal steps (Continued)

- • Air cleaner assembly (Refer to P.15-6)
- >>**E**<< 4. Air pipe B
- >>**D**<< 5. Air hose D

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Group TOC

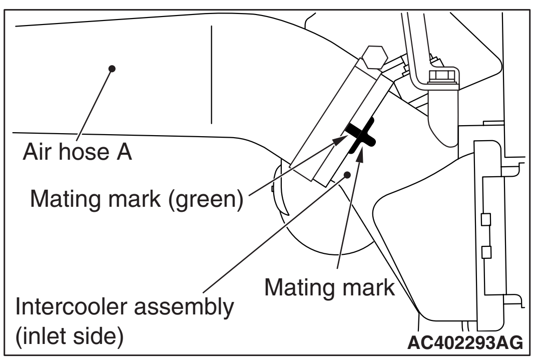
Removal steps (Continued)

>>**C**<< 6. Air pipe A
7. Bracket
>>**B**<< 8. Air hose B
>>**A**<< 9. Air hose A
10. Air outlet fitting
11. Gasket
- Front bumper assembly (Refer to GROUP 51 – Front Bumper Assembly, Radiator Grille P.51-2).
- Side under cover (LH)

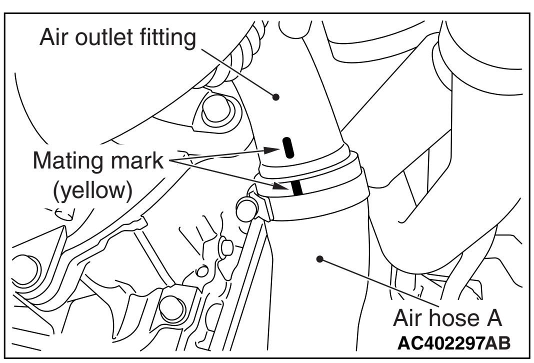
12. Intercooler assembly, intercooler inlet air duct, intercooler air pipe
13. Intercooler assembly
14. Intercooler air pipe
15. O-ring
16. Intercooler inlet air duct
17. Bracket
18. Bracket
19. Intercooler baffle plate
20. Bracket

INSTALLATION SERVICE POINTS

>>A<<AIR HOSE A INSTALLATION

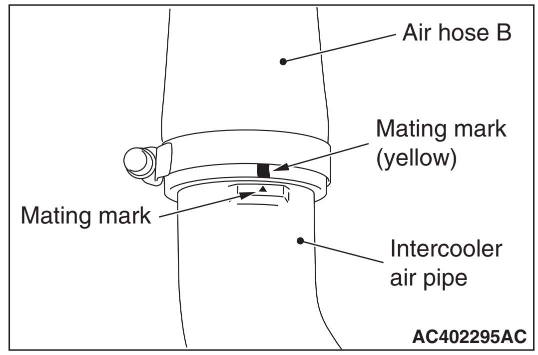


1. Install by aligning the mating mark (green) on air hose A and the mating mark on the intercooler assembly (inlet side).



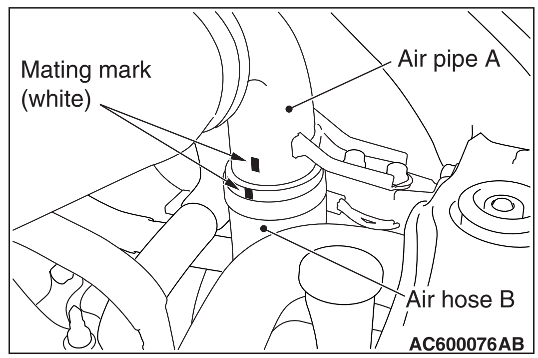
2. Install by aligning the mating marks (yellow) on air hose A and on the air outlet fitting.

>>B<<AIR HOSE B INSTALLATION



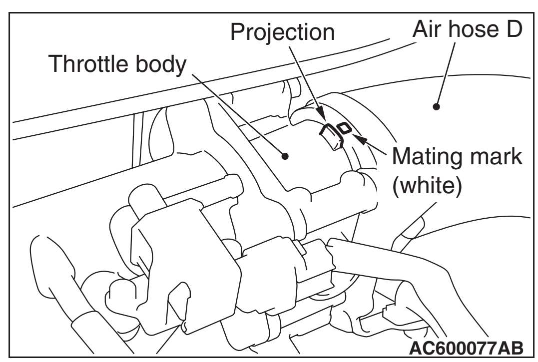
Install by aligning the mating mark (yellow) on air hose B and the mating mark on the intercooler air pipe.

>>C<<AIR PIPE A INSTALLATION



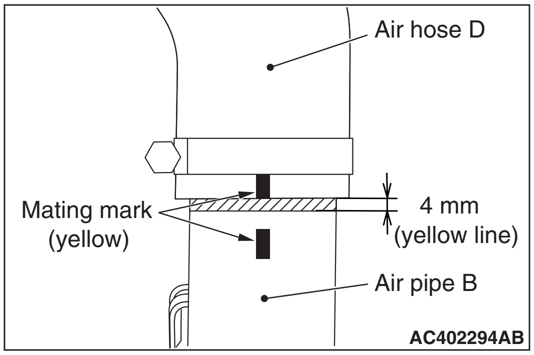
Install by aligning the mating marks (white) on air pipe A and on air hose B.

>>D<<AIR HOSE D INSTALLATION



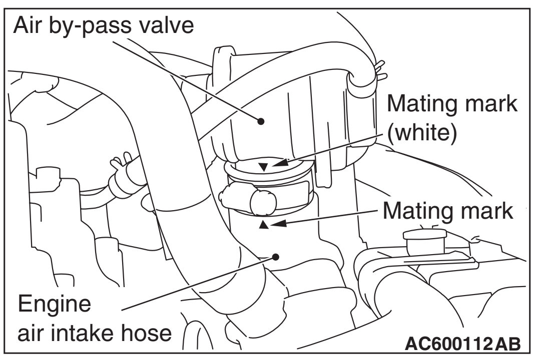
Install by aligning the mating mark (white) on air hose D and the projection on the throttle body.

>>E<<AIR PIPE B INSTALLATION



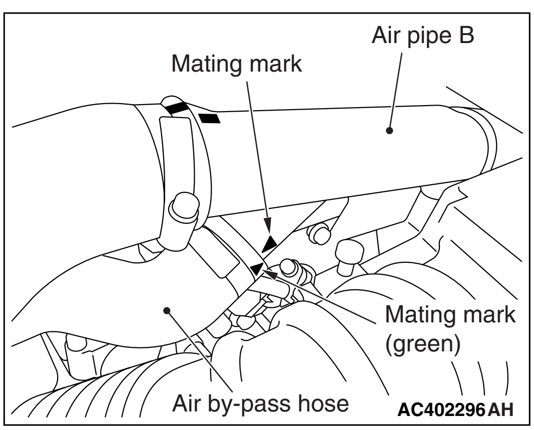
1. Align the end of air hose D so that the width of the yellow line on air pipe B should be 4 mm.
2. Install by aligning the mating marks (yellow) on air pipe B and on air hose D.

>>F<<AIR BY-PASS VALVE INSTALLATION

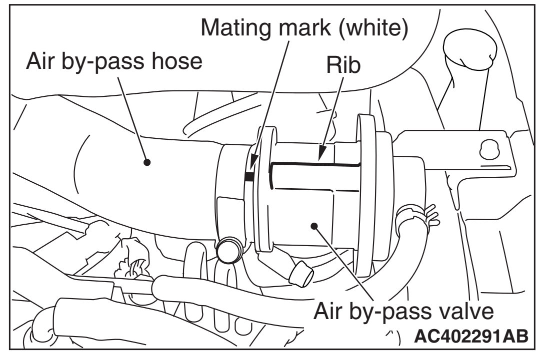


Install by aligning the mating mark (white) on the air by-pass valve and the mating mark on the engine air intake hose.

>>G<<AIR BY-PASS HOSE INSTALLATION

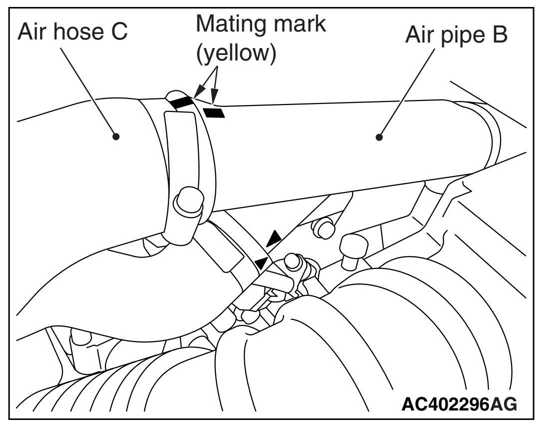


1. Install by aligning the mating mark (green) on the air by-pass hose and the mating mark on air pipe B.

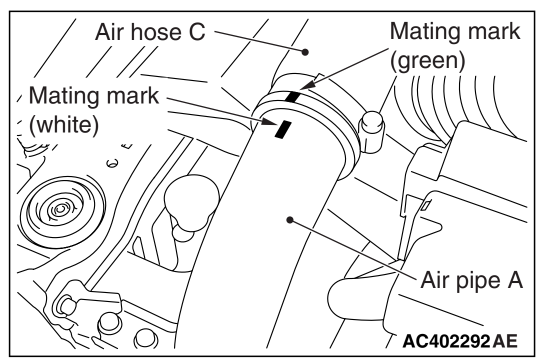


2. Install by aligning the mating mark (white) on the air by-pass hose and the centre of the air by-pass valve rib.

>>H<<AIR HOSE C INSTALLATION



1. Install by aligning the mating marks (yellow) on air hose C and on air pipe B.



2. Install by aligning the mating mark (green) on the air hose C and the mating mark (white) on the air pipe A.

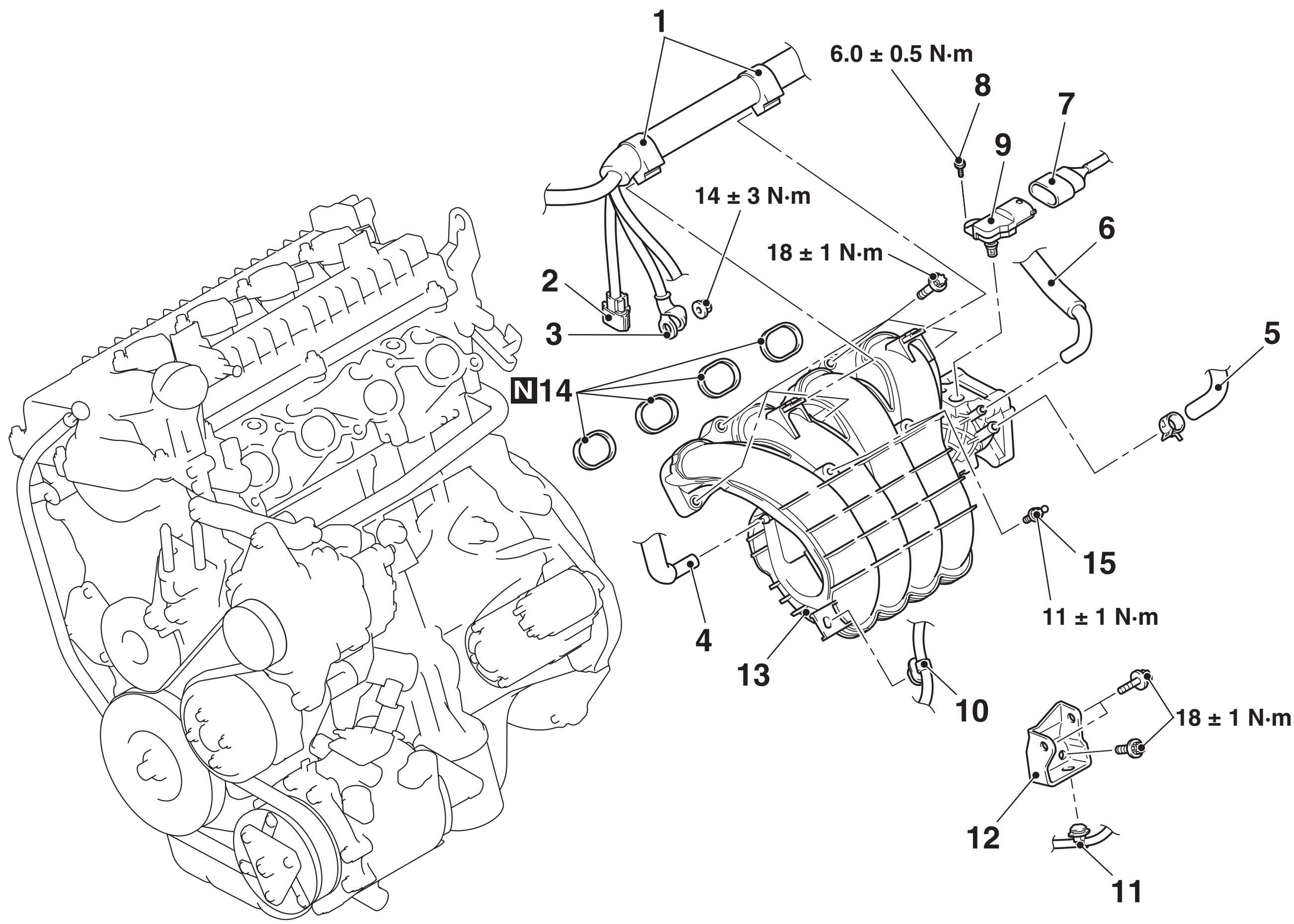
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Group TOC

INLET MANIFOLD

REMOVAL AND INSTALLTION <4A9>

M1151003001816

Pre-removal Operation	Post-installation Operation
• Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service − Engine Coolant Replacement P.14-4). • Air Cleaner Assembly, Air Intake Duct Removal (Refer to P.15-5). • Throttle Body Removal (Refer to GROUP 13A, Throttle Body P.13A-370). • Fuel Injector Removal (Refer to Group 13A, Injector P.13A-367). • EGR Valve Assembly Removal <CVT> (Refer to GROUP 17, EGR Valve P.17-22).	• EGR Valve Assembly Installation <CVT> (Refer to GROUP 17, EGR Valve P.17-22). • Fuel Injector Installation (Refer to GROUP 13A, Injector P.13A-367). • Throttle Body Installation (Refer to GROUP 13A, Throttle Body P.13A-370). • Air Cleaner Assembly, Air Intake Duct Installation (Refer to P.15-5). • Engine Coolant Refilling (Refer to GROUP 14, On-vehicle Service − Engine Coolant Replacement P.14-4).



AC601295AB

Removal steps

1. Harness clamp connection
2. Alternator connector
3. Alternator terminal
4. PCV hose connection
5. Brake booster vacuum hose connection <M/T>
6. Purge hose connection <M/T>
7. Manifold absolute pressure sensor connector

Removal steps (Continued)

>>**A**<< 8. Screw
9. Manifold absolute pressure sensor
10. Harness clamp connection
11. Harness clamp connection <M/T>
12. Inlet manifold stay <M/T>
13. Inlet manifold
14. Inlet manifold gasket
15. Ball stud

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Group TOC

INSTALLATION SERVICE POINT

>>A<< SCREW INSTALLATION

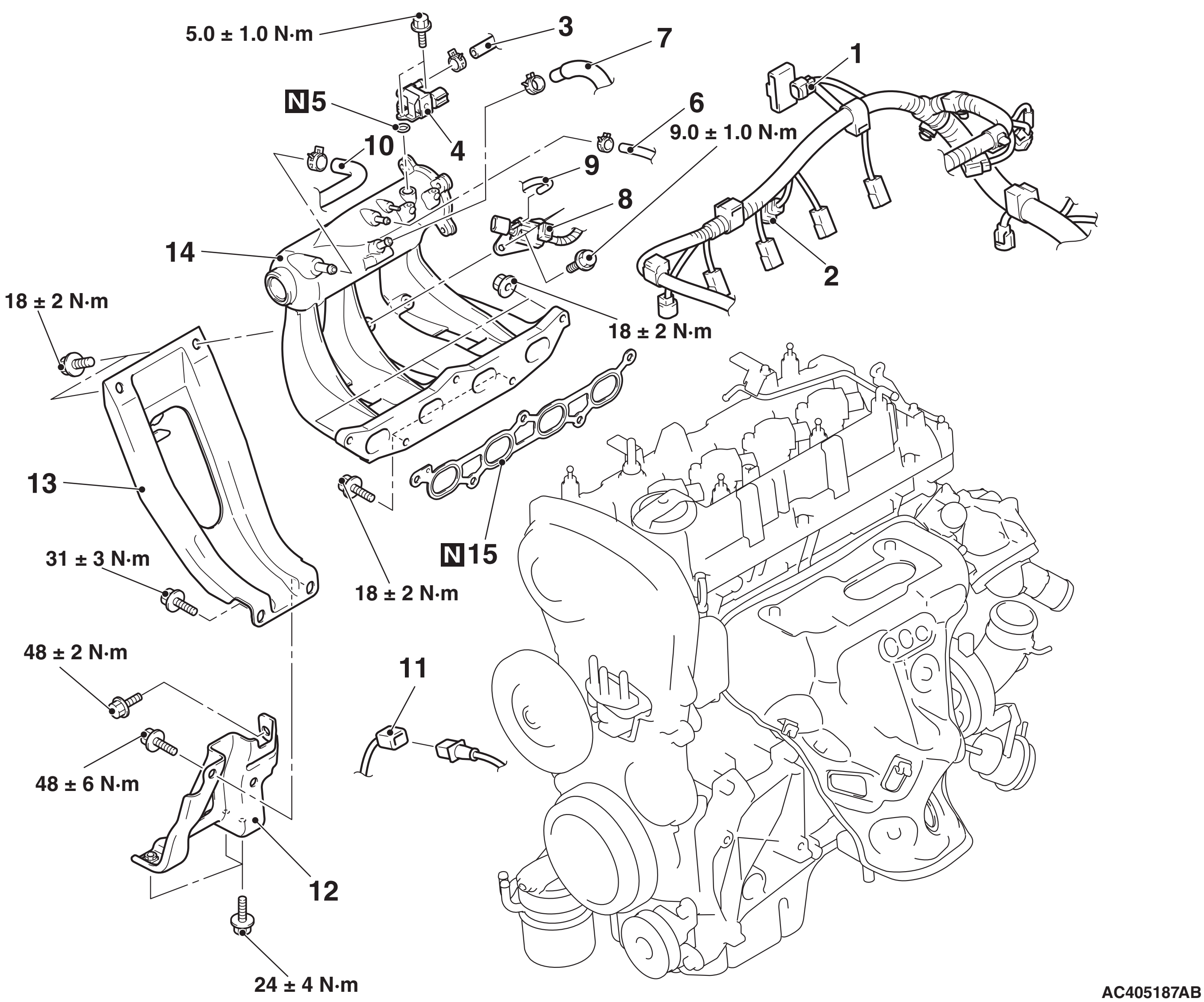
⚠ CAUTION

Do not over-tighten. As the self-forming-type screw is used, the excessive torque can damage the inlet manifold threads.

REMOVAL AND INSTALLTION <4G1>

M1151003001838

Pre-removal Operation	Post-installation Operation
• Cowl Top Panel Removal (Refer to GROUP42, Loose Panel P.42-81). • Engine Coolant Draining (Refer to GROUP14, On-vehicle Service − Engine Coolant Replacement P.14-6). • Air Cleaner Assembly, Air Intake Duct Removal (Refer to P.15-6). • Air Hose C, Air Pipe B, Air Hose D Removal (Refer to P.15-8). • Throttle Body Removal (Refer to GROUP 13B, Throttle Body Assembly P.13B-373). • Fuel Injector Removal (Refer to GROUP 13B, Injector P.13B-370).	• Fuel Injector Installation (Refer to GROUP 13B, Injector P.13B-370). • Throttle Body Installation (Refer to GROUP 13B, Throttle Body Assembly P.13B-373). • Air Hose C, Air Pipe B, Air Hose D Installation (Refer to P.15-8). • Air Cleaner Assembly, Air Intake Duct Installation (Refer to P.15-6). • Engine Coolant Refilling (Refer to GROUP14, On-vehicle Service − Engine Coolant Replacement P.14-6). • Cowl Top Panel Installation (Refer to GROUP42, Loose Panel P.42-81).



AC405187AB

Main Index
Group TOC

Removal steps

1. Purge control solenoid valve connector
2. Fuel pressure solenoid valve connector
3. Fuel vapour control hose connection
4. Purge control solenoid valve
5. O-ring
6. Vacuum hose connection
7. PCV hose connection

Removal steps (Continued)

8. Fuel pressure solenoid valve
9. Vacuum hose connection
10. Brake booster vacuum hose connection
11. Detonation sensor connector
12. Bracket
13. Inlet manifold stay
14. Inlet manifold
15. Inlet manifold gasket

INSPECTION

M1151003100832

Check the following points; replace the part if a problem is found.

INLET MANIFOLD CHECK

1. Check for damage or cracking of any part.
2. Clogging of the negative pressure (vacuum) outlet port, or clogging of the exhaust gas recirculation passages.
3. Using a straight edge and feeler gauge, check for distortion of the cylinder head installation surface.

   Standard value: 0.15 mm or less
   Limit: 0.20 mm

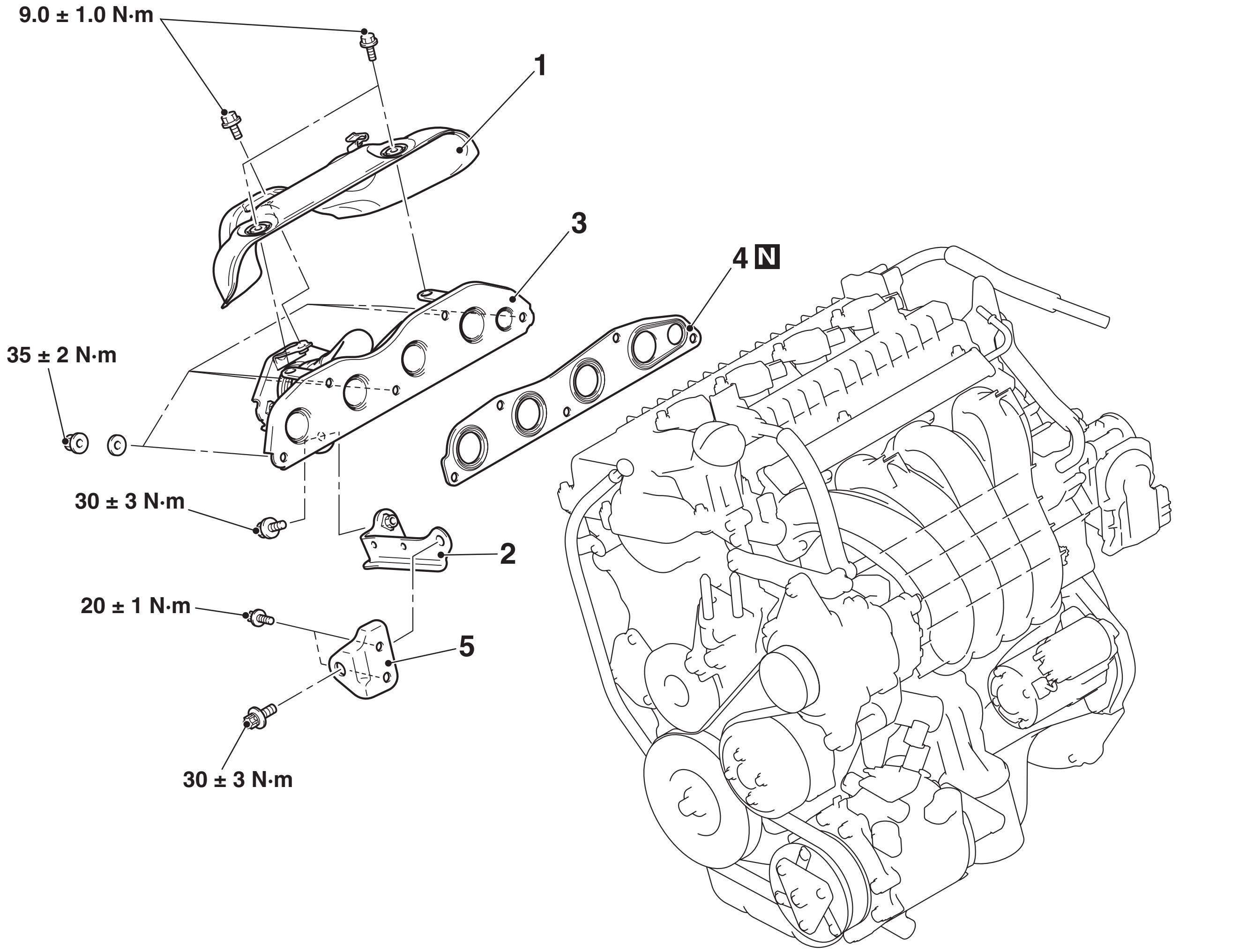
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EXHAUST MANIFOLD

REMOVAL AND INSTALLATION <4A9>

M1151003301464

Pre-removal Operation	Post-installation Operation
• Cowl Top Panel Removal (Refer to GROUP42, Loose Panel P.42-81). • Front Exhaust Pipe Removal (Refer to GROUP 15 P.15-19).	• Front Exhaust Pipe Installation (Refer to GROUP15 P.15-19). • Cowl Top Panel Installation (Refer to GROUP42, Loose Panel P.42-81).



AC405244AB

Removal steps
1. Exhaust manifold cover
2. Exhaust manifold bracket B
3. Exhaust manifold

Removal steps (Continued)
4. Exhaust manifold gasket
5. Exhaust manifold bracket A

INSPECTION <4A9>

M1151003400651

Check the following points; replace the part if a problem is found.

EXHAUST MANIFOLD CHECK

1. Check for damage or cracking of any part.
2. Using a straight edge and a feeler gauge, check for distortion of the cylinder head installation surface.

   Standard value: 0.15 mm or less
   Limit: 0.20 mm

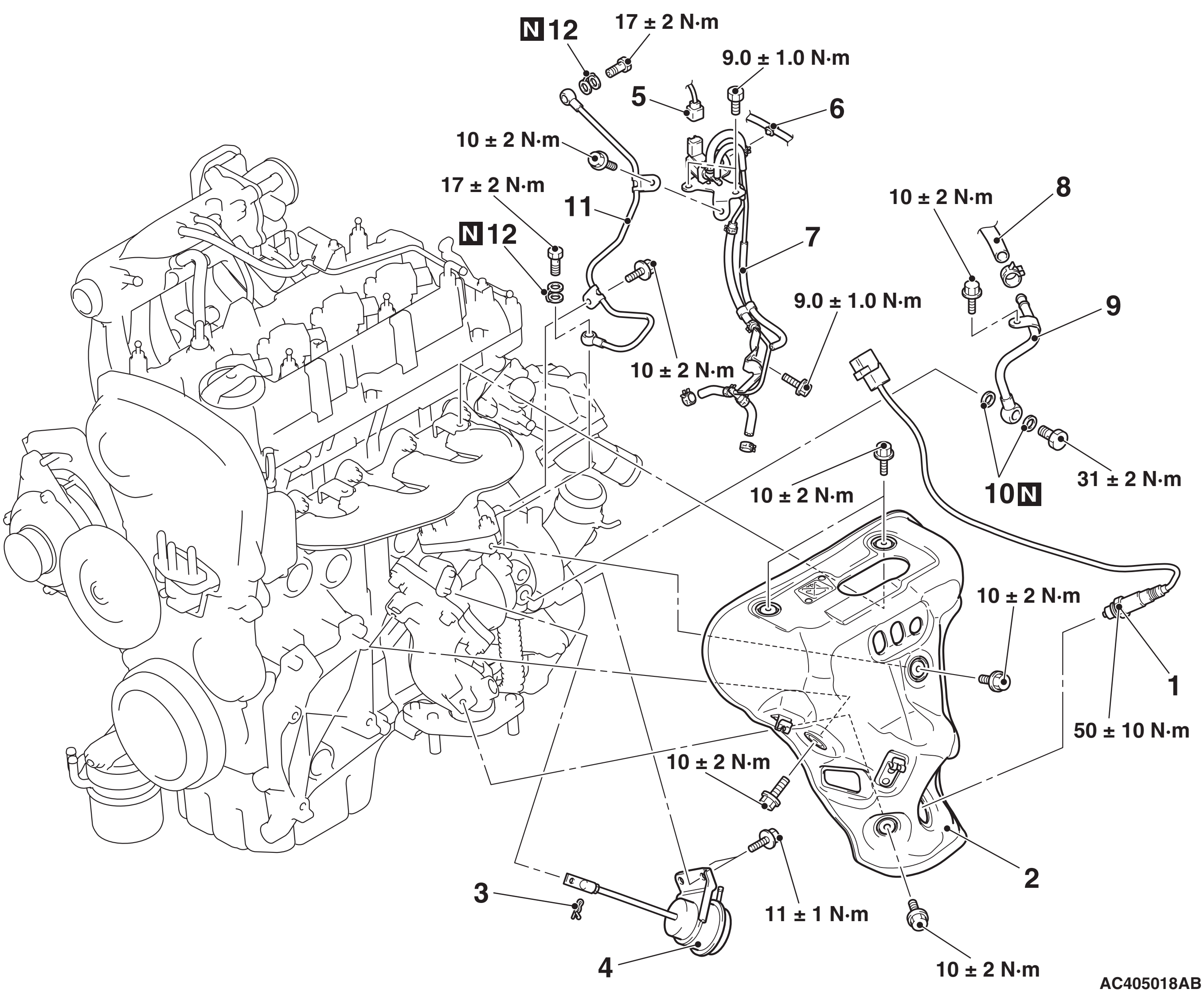
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Group TOC

EXHAUST MANIFOLD AND TURBOCHARGER

REMOVAL AND INSTALLATION <4G1>

M1151008900350

Pre-removal Operation	Post-installation Operation
• Engine air Intake Hose Removal (Refer to P.15-6). • Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service − Engine Coolant Replacement P.14-6). • Engine Oil Draining (Refer to GROUP 12, On-vehicle Service − Engine Oil Replacement P.12-4). • Front Catalytic Converter Removal (Refer to GROUP 17, Catalytic Converter P.17-24).	• Front Catalytic Converter Installation (Refer to GROUP 17, Catalytic converter P.17-24). • Engine Oil Refilling (Refer to GROUP 12, On-vehicle Service − Engine Oil Replacement P.12-4). • Engine Coolant Refilling (Refer to GROUP 14, On-vehicle Service − Engine Coolant Replacement P.14-6). • Engine air Intake Hose Installation (Refer to P.15-6).



Removal steps

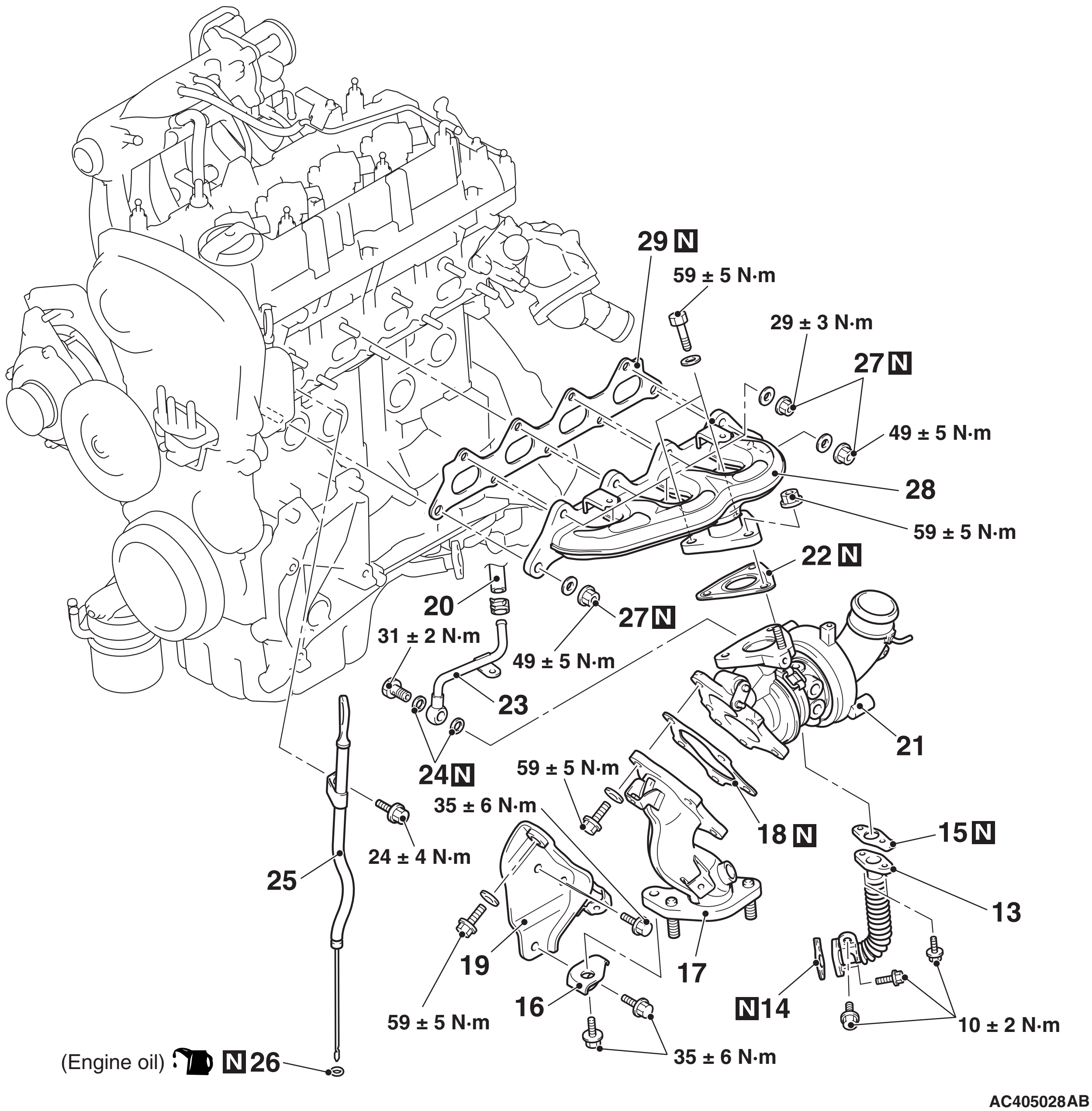
<<A>> >>D<< 1. Oxygen sensor
2. Turbocharger cover
3. Pin
4. Turbocharger waste gate actuator
5. Turbocharger waste gate solenoid valve connector
6. Harness clamp connection

Removal steps (Continued)

7. Turbocharger waste gate solenoid valve, vacuum hose and vacuum pipe assembly
8. Turbocharger water return hose connection
9. Turbocharger water return pipe
10. Gasket

<<B>> 11. Turbocharger oil feed tube
12. Gasket

Main Index
Group TOC



Removal steps

13. Turbocharger oil return tube
>>**C**<< 14. Turbocharger oil return tube gasket (oil pan side)
>>**B**<< 15. Turbocharger oil return tube gasket (turbocharger assembly side)
16. Bracket
- Air outlet fitting (Refer to P.15-8).
17. Turbocharger exhaust outlet fitting
18. Gasket
19. Bracket

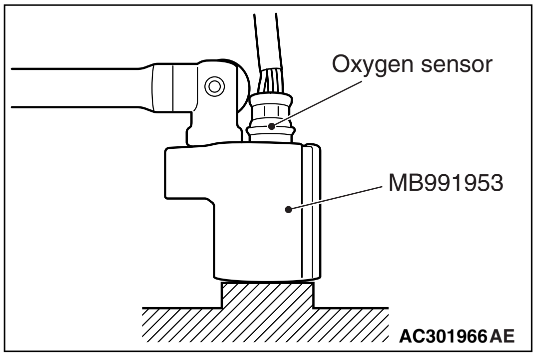
Removal steps (Continued)

20. Turbocharger water feed hose connection
>>**A**<< 21. Turbocharger assembly
22. Gasket
23. Turbocharger water feed pipe
24. Gasket
25. Oil level gauge guide
26. O-ring
27. Nut
28. Exhaust manifold
29. Exhaust manifold gasket

Main Index
Group TOC

REMOVAL SERVICE POINTS

<<A>> OXYGEN SENSOR REMOVAL



Remove the connection and clamp of oxygen sensor connector, and then use special tool oxygen sensor wrench (MB991953) to remove the oxygen sensor.

<<B>> TURBOCHARGER OIL FEED TUBE REMOVAL

⚠ CAUTION

After removing the turbocharger oil feed tube, be careful that any foreign materials does not get into the oil passages of the turbocharger.

INSTALLATION SERVICE POINTS

>>A<< TURBOCHARGER ASSEMBLY INSTALLATION

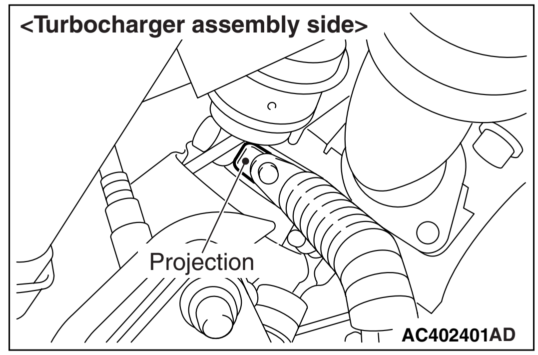
1. Clean the turbocharger oil feed tube, water feed pipe and water return pipe fitting, the inside of eye bolts, and individual pipe for clogs.

⚠ CAUTION

Be careful that any foreign materials does not get into the turbocharger.

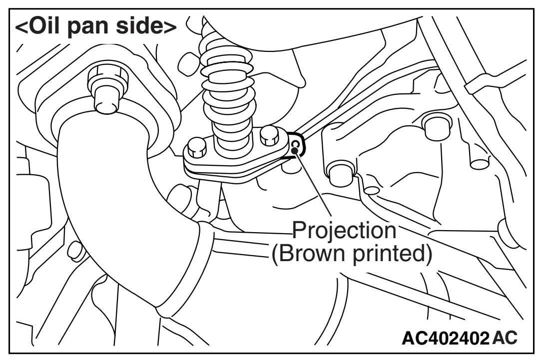
2. Clean or blow the air if carbon residues are stuck to the oil passages of turbocharger assembly.
3. Add new engine oil through the turbocharger oil feed tube of turbocharger assembly.

>>B<< TURBOCHAGER OIL RETURN TUBE GASKET (TURBOCHARGER ASSEMBLY SIDE) INSTALLATION



Install the gasket as its protrusion is in the direction shown.

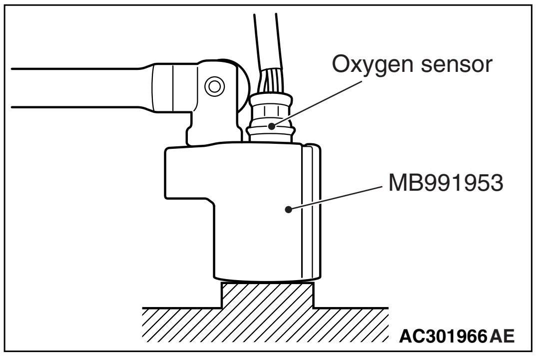
>>C<< TURBOCHAGER OIL RETURN TUBE GASKET (OIL PAN SIDE) INSTALLATION



With the print area on the gasket facing to the pipe, install the gasket so that the protrusion is in the direction shown in the figure.

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Group TOC

>>D<< OXYGEN SENSOR INSTALLATION



1. Tighten the oxygen sensor to the specified torque by using special tool oxygen sensor wrench (MB991953).

   Tightening torque: 50 ± 10 N·m

2. Connect the oxygen sensor connector and install the connector bracket.

INSPECTION <4G1>

M1151003400662

Check the following points; replace the part if a problem is found.

EXHAUST MANIFOLD CHECK

1. Check for damage or cracking of any part.
2. Using a straight edge and a feeler gauge, check for distortion of the cylinder head installation surface.

   Standard value: 0.15 mm or less
   Limit: 0.20 mm

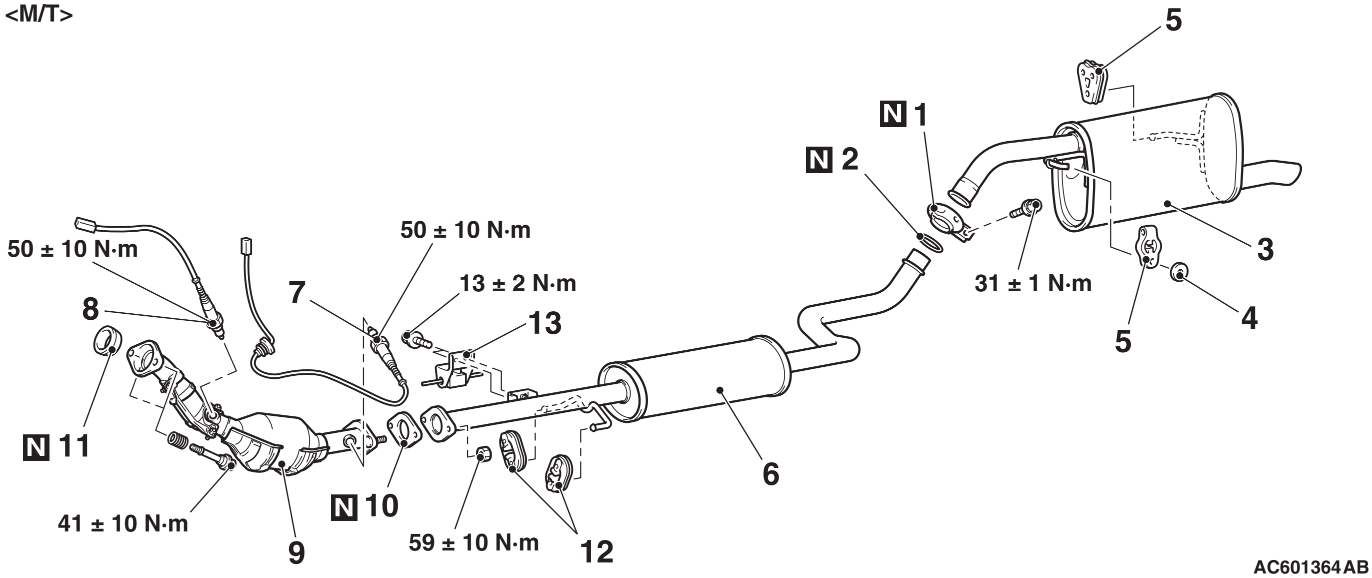
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EXHAUST PIPE AND MAIN MUFFLER

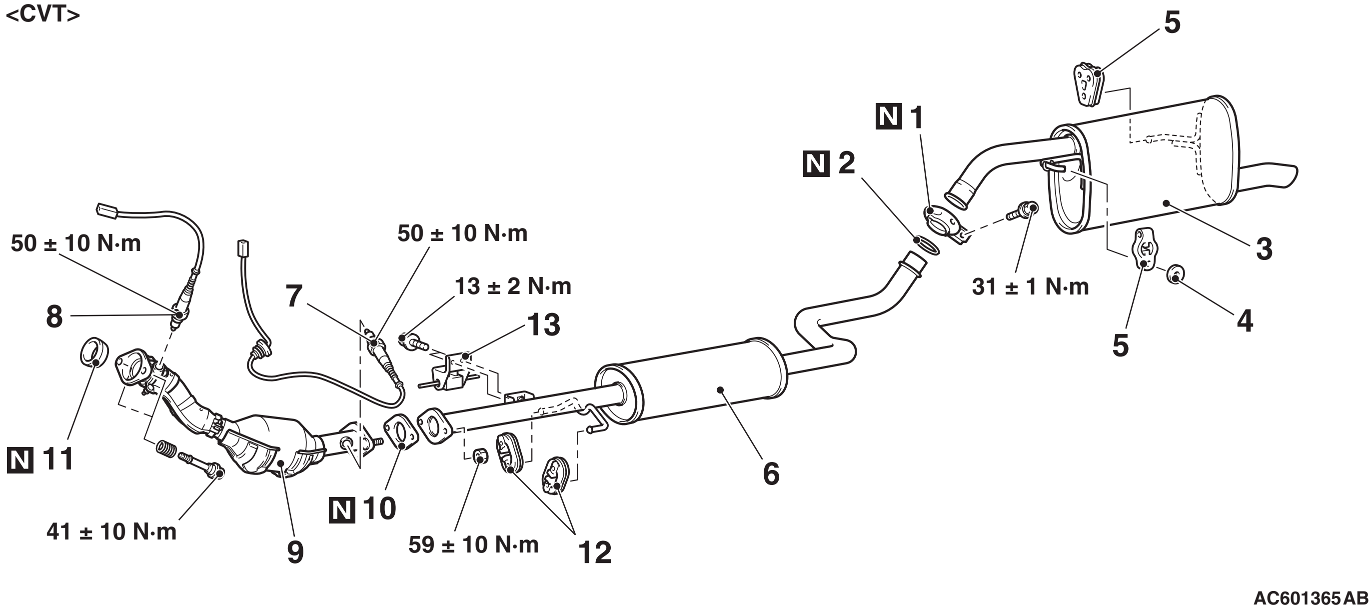
REMOVAL AND INSTALLATION <4A9>

M1151008701315

<M/T>



<CVT>



Exhaust main muffler removal steps

>>**B**<< 1. Exhaust pipe clamp
>>**B**<< 2. Exhaust pipe gasket
3. Exhaust main muffler
4. Exhaust muffler hanger bracket stopper
5. Exhaust muffler hanger

Exhaust centre pipe removal steps

>>**B**<< 1. Exhaust pipe clamp
>>**B**<< 2. Exhaust pipe gasket
6. Centre exhaust pipe

Exhaust centre pipe removal steps (Continued)

10. Exhaust pipe gasket
12. Exhaust muffler hanger
13. Exhaust pipe damper

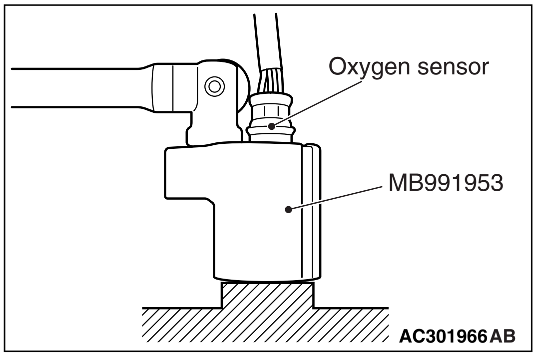
Exhaust front pipe removal steps

<<**A**>> >>**A**<< 7. Oxygen sensor
<<**A**>> >>**A**<< 8. Oxygen sensor
9. Front exhaust pipe
10. Exhaust gasket
11. Seal ring

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REMOVAL SERVICE POINT

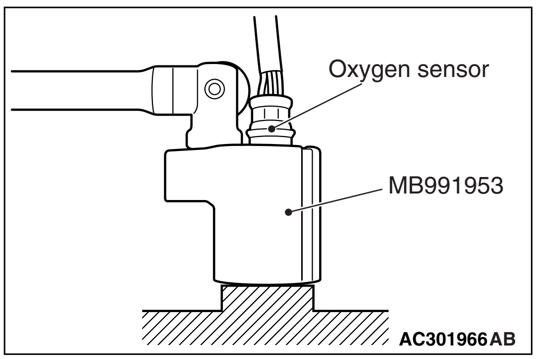
<<A>> OXYGEN SENSOR REMOVAL



Remove the connection and clamp of oxygen sensor connector, and then use special tool oxygen sensor wrench (MB991953) to remove the oxygen sensor.

INSTALLATION SERVICE POINTS

>>A<< OXYGEN SENSOR INSTALLATION

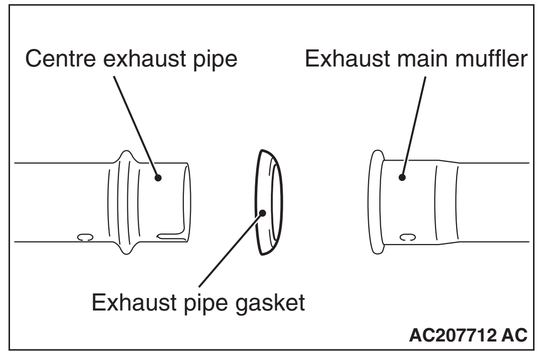


1. Tighten the oxygen sensor to the specified torque by using special tool oxygen sensor wrench (MB991953).

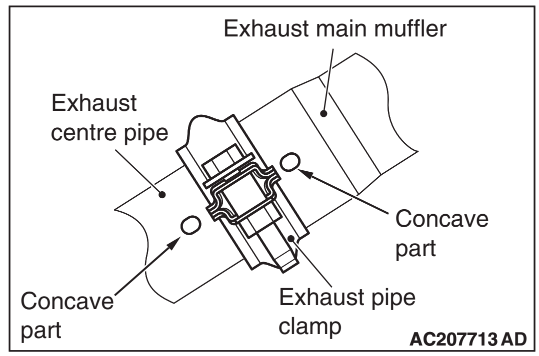
   Tightening torque:50 ± 10 N·m

2. Connect the oxygen sensor connector and install the connector bracket.

>>B<< EXHAUST PIPE GASKET / EXHAUST PIPE CLAMP INSTALLATION



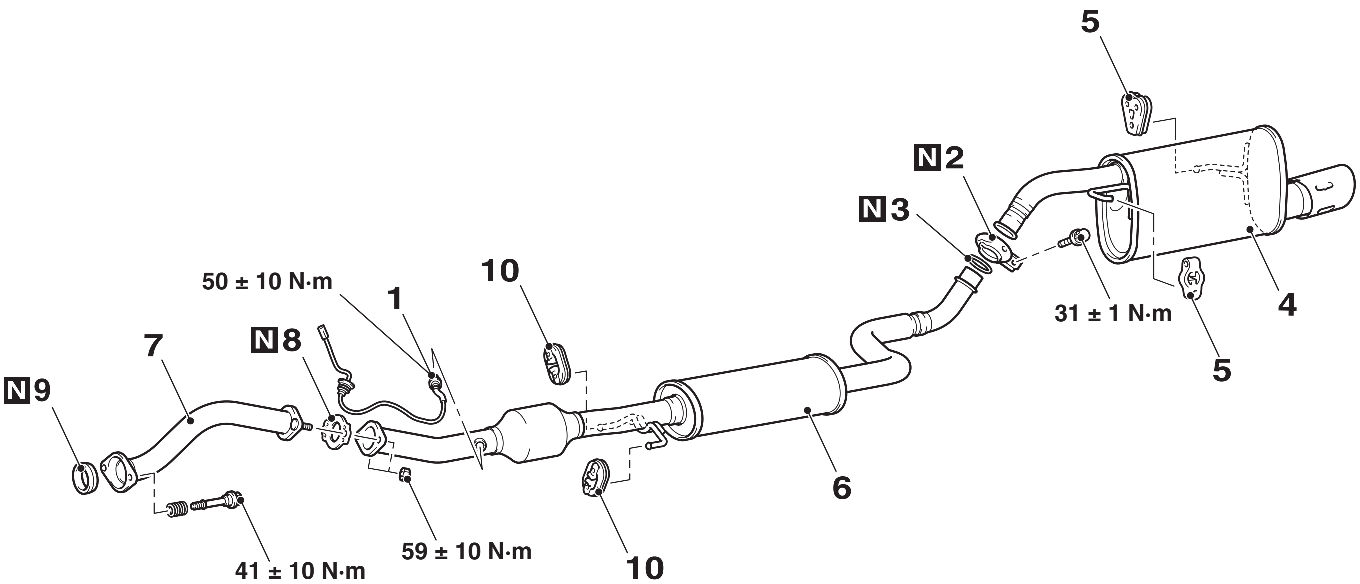
1. Install the exhaust pipe gasket in the direction shown in the illustration.



2. Confirm that the exhaust main muffler and the concave parts at the rear side of the centre exhaust pipe are located as shown in the illustration. Install the exhaust pipe clamp so that its mounting bolts are in the direction shown in the illustration.

REMOVAL AND INSTALLATION <4G1>

M1151008701326



			Exhaust main muffler removal steps
	>>**A**<<	2.	Exhaust pipe clamp
	>>**A**<<	3.	Exhaust pipe gasket
		4.	Exhaust main muffler
		5.	Exhaust muffler hanger
			Exhaust centre pipe removal steps
<<**A**>>	>>**B**<<	1.	Oxygen sensor
	>>**A**<<	2.	Exhaust pipe clamp
	>>**A**<<	3.	Exhaust pipe gasket

Exhaust centre pipe removal steps (Continued)

6. Centre exhaust pipe
8. Exhaust pipe gasket
10. Exhaust muffler hanger

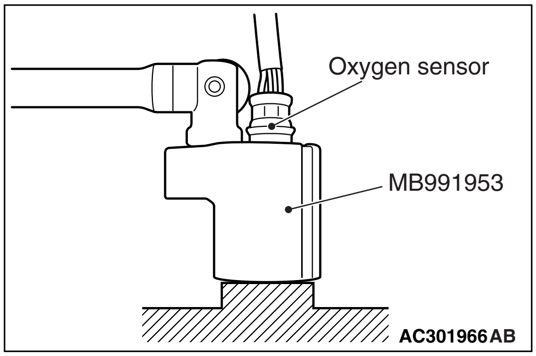
Exhaust front pipe removal steps

7. Front exhaust pipe
8. Exhaust pipe gasket
9. Seal ring

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REMOVAL SERVICE POINT

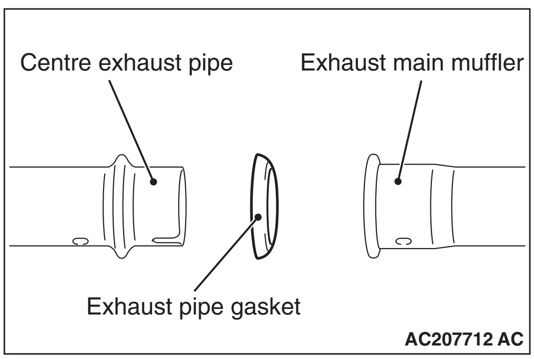
<<A>> OXYGEN SENSOR REMOVAL



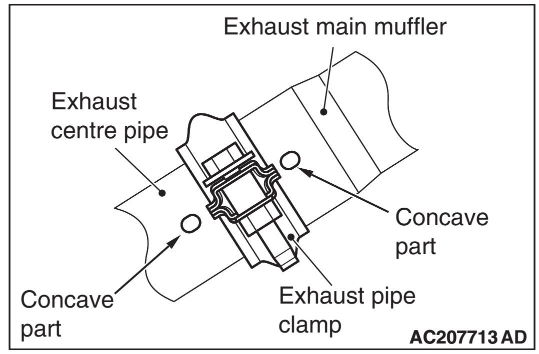
Remove the connection and clamp of oxygen sensor connector, and then use special tool oxygen sensor wrench (MB991953) to remove the oxygen sensor.

INSTALLATION SERVICE POINTS

>>A<< EXHAUST PIPE GASKET/EXHAUST PIPE CLAMP INSTALLATION

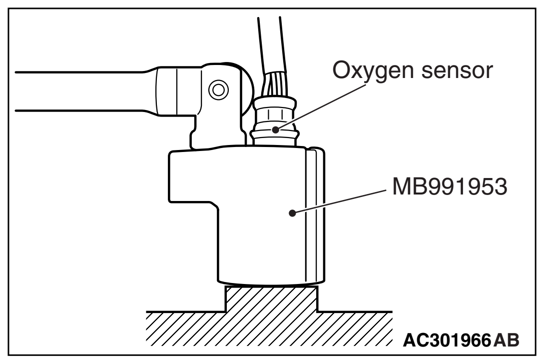


1. Install the exhaust pipe gasket in the direction shown in the illustration.



2. Confirm that the exhaust main muffler and the concave parts at the rear side of the centre exhaust pipe are located as shown in the illustration. Install the exhaust pipe clamp so that its mounting bolts are in the direction shown in the illustration.

>>B<< OXYGEN SENSOR INSTALLATION



1. Tighten the oxygen sensor to the specified torque by using special tool oxygen sensor wrench (MB991953).

   Tightening torque:50 ± 10 N·m

2. Connect the oxygen sensor connector and install the connector bracket.